REMARKS

Introduction

Claims 28-29 and 46-56 are pending, of which claims 53-55 have been withdrawn due to a restriction requirement. Claim 28 is an active independent claim.

Claims 28 and 29 have been amended to correct informalities in the claim language and to more clearly define the present subject matter. Support for the amendment is found, for example, at page 32, lines 10-15, page 32, lines 18-25, page 34, lines 19-26 and page 36, lines 3-6 of the specification. Claims 27 and 30-44 have been cancelled without prejudice or disclaimer of the subject matter thereof. Claim 58 has been added, which is supported by, for example, page 34, lines 7-9 of the specification. Care has been taken to avoid introducing new matter.

Non-Obviousness under 35 U.S.C. § 103(a)

Claims 27-31 and 46-47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsukamoto et al. (US 7,282,742). Claims 27-34, 36-37 and 46-51 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirai et al. (US 6,794,220) in view of Tsukamoto et al. These rejections are traversed for at least the following reasons.

With respect to claim 28, Applicants respectfully submit that, at a minimum, Tsukamoto fails to disclose that plural ones of the nanotubes are chemically joined with each other in the semiconductor layer. According to claim 28, by utilizing chemically joined nanotubes in the composite material forming the semiconductor layer, it is possible to increase the number of nanotubes or the fill density of nanotubes in the semiconductor layer, to increase the density of electric contacts between nanotubes and to improve the carrier mobility. In addition, incorporation of nanotubes chemically joined with each other in the semiconductor layer makes

it possible to enhance the mechanical strength of the semiconductor layer (see, page 35, line 23 to page 36, line 6 of the specification).

Further, in the subject matter of claim 28, the number of carbon nanotubes placed and the density of electrical contacts between the nanotubes can be increased, and hence a thin film transistor, which has superior characteristics to a thin film transistor having a composite-type semiconductor layer composed of a mixture of an organic semiconductor material and nanotubes (NT) in which the nanotubes are merely dispersed by mixing as in Tsukamoto, can be obtained (see page 37, lines 9-16 of the specification).

The Examiner asserts that col. 7, lines 10-13 of Tsukamoto discloses this feature of claim 28. However, the cited portion discloses that the CNTs (carbon nanotubes) act as bridges between polymers or domains. This portion does not disclose that the CNTs are chemically joined to each other. It is clear that in Tsukamoto, the CNTs are merely dispersed in the polymers and are not chemically joined to each other. It is also clear that Hirai does not disclose or suggest incorporation of the nanotubes into the semiconductor layer.

Based on the foregoing, claim 28 and all claims dependent thereon are patentable over the cited references.

Further, regarding claim 29, by covering the joint portion between the joined nanotubes with the organic semiconductor material, it is possible for the TFT to have high mechanical strength with the nanotubes being firmly held in position. If the joint portion between the joined nanotubes were not covered with the organic semiconductor material, electric conductivity would decrease drastically at the joint portion when the TFT is on. According to the subject matter of claim 29, where the joint portion between the joined nanotubes is covered with the organic semiconductor material, however, when the TFT is on, carriers propagating through each

of the nanotubes can be transmitted between plural joined nanotubes via organic semiconductor material covering the joint portion with intervening the nanotubes. That is, the coverage of the joint portion with the organic semiconductor material can decrease transmittance of the carriers propagating through each of the nanotubes to the joint portion, and thus the organic semiconductor material can compensate for a drop in electric conductivity at the joint portion between nanotubes having high carrier mobility. Therefore, the subject matter of claim 29 can increase the density of electric contacts between nanotubes and diminish the drop in electric conductivity at the joint portion.

Further, in the subject matter of claim 29, since the nanotubes do not contact directly to each other and joint portions of the plural ones of nanotubes are covered with the organic semiconductor material, when the TFT is off, the off-characteristics of the TFT can be improved.

As set forth above, the subject matter of claim 29 attains advantageous effects in that the TFT that is subject to elevated electric conductivity and less variation in characteristics as compared with conventional products can be fabricated since the organic semiconductor material covering the joint nanotubes can diminish a drop in electric conductivity at the joint portion, and act as protective member to increase mechanical strength at the joint portion (see page 35, lines 11 to page 37, line 1 of the specification).

For the reasons as set forth above, claim 29 would not have been obvious over Tsukamoto and Hirai, taken alone or in the combination thereof.

Thus, Applicants respectfully submit that claims 28-29 and 46-52 are patentable over the cited references and request that the Examiner withdraw the rejections of these claims under 35 U.S.C. § 103(a).

New Claim

Since new claim 58 depends upon claim 28, this claim is patentable over the cited references for at least the same reasons as claim 28.

CONCLUSION

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Respectfully submitted,

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